THE STOKE POGES SCHOOL

Science Learning Journey

At The Stoke Poges School we recognise the importance of science in every aspect of daily life. As one of the core subjects taught in Primary Schools, we give the teaching of science the prominence it requires. Science has changed our lives and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, children are encouraged to recognise the power of explanation and develop a sense of excitement and curiosity about the world around them. They are taught to understand how science can be used to explain what is occurring, predict how things will behave, and analyse data collected. We use Kapow's Science scheme to support our science curriculum, which has been carefully designed to build upon knowledge and skills progressively.

Science Progression							
	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Autumn Term	See progression documents and website under Teaching and Learning - EYFS	Seasons Physics Everyday materials Chemistry	Use of everyday materials Chemistry Living things and their habitats Biology	Light and shadows Physics Rocks and soils Chemistry	Electricity Physics Animals, including humans Biology	Earth in space Physics Unbalanced Forces Physics	Evolution and inheritance Biology Animals, including humans Biology
Spring Term		Animals, including humans Biology	Living things and microhabitats Biology Animals, including humans Biology	Animals, including humans Biology Forces and magnets Physics	Living things and their habitats Biology States of matter Chemistry	Uses and properties of materials Chemistry	Light and reflection Physics Electricity Physics
Summer Term		Plants Biology Making Connections	Plants Biology Making Connections	Plant Reproduction Biology Making Connections	Sound Physics Making Connections	Living things and their environment Biology Animals, including humans Biology Making Connections	Living things and their habitats Biology Making Connections

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Designing our Science Curriculum

National curriculm guidance											
Scientific knowledge and understanding				Working scientifically			Science in actoin				
Develop scientific and conceptual understanding through the specific disciplines of biology, chemistry and physics.				Develop understanding of the nature, processes and methods of science through different types of scientific enquiries that help them to answer scientific questions about the world around them.			Ensure all children are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.				
Primary Key Concepts											
Biology				**Chemistry**			**Physics**				
Living things and their habitats	Animals, including humans	Plants	Evolution and inheritance	Everyday materials	States of matter	Changes of materials	Forces and magnets	Light	Sound	Electricity	Earth and Space

Substantive knowledge	Disciplinary knowledge
Referred to as Scientific and conceptual knowledge in the National Curriculum, this is knowledge of the products of science: concepts, laws, theories and models. The National Curriculum attainment targets have been broken down into knowledge components and shown how to build over time to develop pupils' understanding of key concepts in Biology, Chemistry and Physics. The children will build their substantive knowledge base by: • Knowing more facts • Giving further examples of the same concept • Understanding and using a wider range of vocabulary • Using models or concepts that cannot be seen to explain ideas • Making and explaining links across areas of science Over time that knowledge will become increasingly organised and connected. *Get Ready* sections of the lesson helps pupils to activate their prior knowledge and encourages them to make connections between units.	Working scientifically specifies the understanding of the nature, processes and methods of science for each year group and is covered alongside the Scientific knowledge and understanding strand in each unit. The Working Scientifically statements from the National Curriculum have been broken down further to ensure gradual progression and focused on the teaching of the working scientifically skills.

Progression of knowledge: Substantive concepts

Concept	Summary
Plants 	Students learn about the structure and function of plants, what they need to grow and survive, and the life cycle of flowering plants including pollination, seed formation and dispersal. They explore how plants adapt to different environments and the role they play in the ecosystem. **Studied within this concept:** Parts of a plant and their functions (roots, stems, leaves, flowers), What plants need to grow: light, water, air, nutrients, and temperature, The life cycle of plants: germination, pollination, fertilisation, and seed dispersal, How plants adapt to different environments (e.g. cactus vs. rainforest plants).
Animals, including humans 	The study of invasion of animals, including humans explores the needs, survival, growth and life cycles of animals and humans. Students will learn about nutrition, the human body (including skeletons, muscles, and organs), and the importance of exercise, hygiene, and healthy lifestyles. **Studied within this concept:** The five groups of vertebrates: mammals, birds, reptiles, amphibians, fish, Life cycles: birth, growth, reproduction, and death, Basic needs for survival: food, water, air, shelter, Body parts and their functions (heart, lungs, brain, skeleton, muscles), Nutrition and healthy eating, Personal hygiene and the importance of exercise, Teeth and the digestive system, Human changes from birth to old age.
Living things and their habitats 	Students explore the characteristics of living things and how they are classified. They investigate how animals and plants are suited to their environments, explore food chains, and consider the impact of environmental changes on habitats and biodiversity. **Studied within this concept:** Differences between living, dead, and never-living things, How animals and plants are adapted to their habitats, Identifying and grouping living things, Microhabitats and food chains, Classification of animals (carnivores, herbivores, omnivores), Environmental changes (e.g. climate change, pollution) and how they affect habitats, Grouping organisms using classification keys.
Materials 	Here, students investigate the properties of everyday materials and how they are used. They learn how materials change through heating, cooling, dissolving and mixing, and explore reversible and irreversible changes, linking properties to practical uses. **Studied within this concept:** Identify materials (wood, metal, plastic, glass, fabric, rock, etc.), Properties of materials: hard, soft, absorbent, waterproof, magnetic, transparent, How materials are suited to their purpose, Comparing and grouping materials based on physical properties, States of matter: solids, liquids, gases, Simple reversible changes (melting, freezing, dissolving), Irreversible changes (burning, rusting, cooking), Filtering, sieving, and evaporating.
Energy 	Learning explores different forms of energy such as light, sound, and heat. Students investigate how energy is transferred, how we sense it, and how it affects the world around us, making links to how energy powers our lives and how it can be conserved. **Studied within this concept:** Light: sources, reflection, how we see, shadows, and transparency, Sound: how sound is made, travels through vibrations, pitch, and volume, Heat and temperature: comparing heat sources, insulating materials, Introduction to how energy is used and transferred in daily life, Exploring simple circuits
Forces, Earth and Space 	Students investigate how forces affect motion and shape. They explore gravity, friction, air and water resistance, and magnetism. They learn how forces can be useful, and how they work in everyday objects and mechanisms. Students also learn about the movement of the Earth, Moon and Sun. They explore day and night, the seasons, the phases of the Moon, and the structure of the solar system. They begin to understand the role of gravity in space. **Studied within this concept:** Pushes and pulls as examples of forces, Gravity and its effect on objects, Friction and how it affects movement, Air resistance and water resistance, Magnets: attracting and repelling, magnetic materials, poles, Investigations on how objects move on different surfaces, Levers, pulleys, and gears, The solar system: sun, moon, and planets, Day and night, and the changing seasons, Phases of the moon and lunar cycles, The role of gravity in the solar system.
Making connections 	Students develop scientific thinking through asking questions, predicting outcomes, observing, measuring, recording data, and drawing conclusions. They make connections between different science topics and apply their understanding to real-world contexts. **Studied within this concept:** Asking scientific questions, Planning and carrying out fair tests and investigations, Making predictions and using observations to draw conclusions, Collecting data (using charts, graphs, and tables), Using scientific vocabulary to explain findings, Evaluating the reliability of results and suggesting improvements.

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Progression of Knowledge: Plants

		Reception	Year 1 Introduction to Plants	Year 2 Plant Growth	Year 3 Plant Reproduction
Scientific knowledge and understanding	Plant structure and function	• To know the name for the basic plant parts (leaves, flowers, stem and roots) • To know the names of some familiar flowering plants (e.g. daisy, rose, sunflower, daffodil)	• To know a variety of common plants, and how they differ • To know that decidious trees lose their leaves seasonally, but evergreen trees do not • To know the basic structure (including leaves, flowers, fruit, roots, bulb, seed, trunk, branches, stem) of a variety of common plants, including flowering plants and trees		• To understand the functions of the basic parts of a plant and the relationship between structure and function • To know that water is transported within a plant from the root, through the stem, to the leaves
	Plant growth and needs	• To know plants are alive • To know that seeds need water to grow	• To begin to understand how plants grow and change over time	• To know that seeds and bulbs grow into seedlings by producing roots and shoots • To know that seedlings grow into mature plants by developing parts such as roots, stems, leaves and flowers • To know that seeds need water and warmth to germinate • To know that plants need water, light and a suitable temperature for growth and health	• To know that plants need water, light, air, nutrients and a suitable temperature for growth and health • To understand that the needs for growth and health vary from plant to plant
	Plant Cycle	• To know that seeds grow into plants if taken care of			• To know the life cycle of a plant from seed to mature plant • To know that flowers are the reproductive organ of a plant • To know that the process of pollination is the transfer of pollen to the female (part of the) flower • To know that the process of seed formation is the growth of a seed after pollination • To know some different methods of seed dispersal and the benefits of each

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Progression of Knowledge: Animals, including humans

		Reception	Year 1 Sensitive bodies Comparing animals	Year 2 Life cycles and health	Year 3 Movement and nutrition
Scientific knowledge and understanding	Animal growth	• To know the names of familiar animals (eg. farm animals, pets and animals seen in storybooks)	• To know a variety of common animals (including fish, amphibians, reptiles, birds and mammals)	• To understand how living things change, and that animals have offspring that grow into adults • To know which offspring comes from which parent animal • To know the stage in some animal life cycles	
	Animal structure and function	• To know the main body parts of common animals (number of legs, wings, fur, tail) • To know that animals, including humans use their senses to explore the world	• To know the main body parts of common animals (arms, legs, wings, tails, fins, head, trunk, horns/tusks, shell) • To know key parts of the human body (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) • To know the five main senses: sight, smell, hearing, taste and touch • To know that the skin is used for touch, the tongue is used for taste, the nose is used for smell, the eyes are used for sight and the ears are used for hearing		• To know that animals can be grouped based on the presence of a skeleton • To know that the skeleton in humans and some animals is used for movement, protection and support • To know that the muscular system in humans and some animals works with the skeleton for movement • To know the main bones in the body
	Health and nutrition	• To know that animals need food	• To know that a carnivore is an animal that eats other animals and give some examples • To know that a herbivore is an animal that eats only plants and give some examples • To know that an omnivore is an animal that eats both animals and plants, and to give some examples	• To know that animals, including humans, need water, food and air to survive • To understand the importance of exercise, a balanced diet and hygiene for humans	• To know that animals, including humans, need the right types and amount of nutrition • To understand that humans cannot make their own food and therefore eat to get the nutrition needed • To know the main nutrient groups (carbohydrates, protein, fats, fibre, vitamins, mineral and water • To know that a balanced diet should include all nutrient groups • To describe the diets of different animals

		Year 4 Digestion and food	Year 5 Human timeline	Year 6 Circulation and health
Scientific knowledge and understanding	Animal growth		• To describe the human life cycle, including the stages of growth and development (baby, toddler, child, teenager, adult, elderly) • To describe changes that occur during puberty (in boys and girls) • To know that gestation periods vary across mammals	
	Animal structure and function	• To know the main organs of the human digestive system (mouth, teeth, tongue, oesophagus, stomach, small and large intestines) and describe their simple functions • To know the different types of human teeth (incisor, canine, premolar, molar) and their simple functions		• To know the main parts of the human circulatory system (heart, blood vessels and blood) • To know that the heart pumps blood around the body • To know that blood vessels transport blood around the body • To know that the blood transports vital substances around the body, including oxygen and nutrients • To understand the relationship between different organ systems
	Health and nutrition	• To know that teeth can be damaged, including the effect of sugary and acidic food • To know that it is important to brush teeth twice a day, make good food choices and vist the dentist regularly • To describe the teeth of carnivores and herbivores, and understand why they are different • To know that predators hunt for their food and prey are the animals being hunted • To know that producers make their own food • To know that food chains begin with a producer followed by consumers, and arrows to show the energy passed on		• To understand the impact of diet, exercise, drugs and lifestyle on the way a body functions • To know that the heart rate is the number of beats per minute • To know that exercise increases heart rate

Progression of Knowledge: Living things and their habitats

		Reception	Year 2 Habitats Microhabitats	Year 4 Classification and changing habitats
Scientific knowledge and understanding	Characteristics of living things	• To know that animals and plants move, grow, and feed • To know the difference between things that are living and things that are non-living • To know that some animals hibernate or store food in winter	• To begin to understand some of the life processes, including movement, reproduction, sensitivity, growth, excretion and nutrition • To know the difference between things that are living, dead and things that have never been alive, using some of the life processes	• To know that living things can be grouped in different ways • To know that a classifiction key can be used to group and identify plants and animals • To know that vertebrates are animals which have a backbone and invertebrates are animals which do not have a backbone • To know that plants can be grouped into flowering or non-flowering varieties • To know that flowering plants include grasses and non-flowering plants includes ferns and mosses • To know that there are 5 main vertebrate groups: birds, mammals, reptiles, amphibians and fish • To know that invertebrate groups include snails, slugs, worms, spiders and insects
	Variation and inheritance	• To know the names of familiar animals (eg. farm animals, pets and animals seen in storybooks • To know the names of some familiar flowering plants (eg. daisy, rose, sunflower and daffodil)	• To know a variety of plants and animals and describe some differences	
	Habitats and interdependence	• To know that plants and animals live in a range of different places • To name some different places where animals live on the school site	• To name a variety of habitats, including woodland, ocean, rainforest and seashore • To know that a habitat is the environment where an animal or plant lives/grows, because it provides what they need to survive • To know that a micro-habitat is a very small habitat (eg. stones, logs and leaf litter) • To understand that a food chain can be used to show how animals obtain food from eating either plants and/or other animals	• To know that habitats can change throughout the year and this can be dangerous for living things • To know that humans can have both a positive and negative impact on the environment

		Year 5 Life cycles and reproduction	Year 6 Classifying big and small Evolution and inheritance
Scientific knowledge and understanding	Characteristics of living things		• To know that 'organism' is a term used to refer to an individual living thing • To know that micro-organisms are incredibly small and cannot usually be seen by the naked eye • To know the characteristics of the different groups of vertebrates and commonly found invertebrates
	Variation and inheritance	• To know that a life cycle shows the changes an animal or plant goes through until the reproduction of a new generation when the cycle starts again • To know that all living things must reproduce for the species to survive • To know that sexual reproduction requires two parents, whereas asexual reporoduction only requires one parent • To know that there are different processes plants and animals use to reproduce (asexual and sexual reproduction)	• To know that living things have changed over time • To know that fossils provide us with information about living things that inhabited the Earth millions of years ago • To know that characteristics are passed from parents to their offspring, but that all offspring vary from their parents • To know that over time, variation in offspring can affect animals' chances of survival in particular environments
	Interdependence		• To know that animals and plants have adapted to suit their environment over many millions of years and that this process can be called evolution

Progression of Knowledge: Materials

		Reception	Year 1 Everyday materials	Year 2 Uses of everyday materials	Year 3 Rocks and soil
Scientific knowledge and understanding	Identifying and naming	•	• To know that objects are items or things • To know that a material is what an object is made from • To identfiy and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock		• To know that rocks can be grouped based on their appearance or properties (eg. colour, texture, hardness, permability) • To know that rocks may contain grains, crystals or fossils • To know that grains and crystals appear differently and can be used to classify rocks • To know that soils are made from rocks and dead matter
	Properties and uses	• To know objects float or sink	• To know that property refers to how a material can be described • To describe the physical properties of a variety of everyday materials • To understand that materials can be grouped based on their physical properties	• To know why objects are made from particular materials and to give examples of their suitability • To know that one material can be used for a range of purposes (and to give examples) • To know that different materials can be used for the same purpose (and to give examples) • To know why certain materials are unsuitable for particular objects	• To understand the relationship between the properties of rocks and their uses
	Change	• To know some objects move when pushed or pulled • To know some objects freeze or melt		• To know that a push or pull must be applied to change the shape of a solid object • To know that solid objects can be squashed, bent, twisted or stretched • To know that different solid objects may take a different amount of force to change shape	• To know that fossils can form the remains of living things • To know that rocks can change over time (eg. erosion, weathering)

		Year 4 States of matter	Year 5 Mixtures and separation Properties and changes
Scientific knowledge and understanding	Identifying and naming	• To know that all substances around us can exist as solids, liquids and gases	
	Properties and uses	• To know that a property of a solid is that it keeps its shape unless a force is applied to it • To know that a property of a liquid can flow freely and take on a shape of a container • To know that a property of a gas does not have a fixed shape and can escape from an unsealed container	• To describe a broader range of materials and their properties, including hardness, solubility, transparency, conductivity and response to magnets
	Change	• To know that heating causes solids to turn into liquids (melting) and liquids to turn into gases (evaporating) • To know that cooling causes gases to turn into liquids (condensing) and liquids to turn into solids (freezing) • To know that water can exist as a solid, liquid or a gas • To know that the melting point of water is zero degrees Celsius and the boiling point of water is 100 degrees Celsius • To know that water flows around the world in a continuous process called the water cycle • To know that in the water cycle, evaporation is when bodies of water are heated and turn into water vapour • To know that in the water cycle, condensation is the process of water vapour cooling to form water droplets in clouds, which can result in precipitation • To know that the rate of evaporation increases as temperature rises	• To know that some substances will dissolve in a liquid to form a solution • To know the factors that affect the time taken to dissolve, including temperature and stirring • To understand that dissolving, mixing and changes of state are reversible changes • To know that some liquids and solids can be separated using sieving, filtering and evaporation and to describe these processes • To understand that some changes result in the formation of new materials and that these are usually irreversible (eg. burning, rusting, the action of acid on bicarbonate of soda)

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Progression of Knowledge: Energy

Light		Reception	Year 3 Light and shadows	Year 6 Light and reflection
Scientific knowledge and understanding	Sources	• To know day is light because the sun is in the sky • To know night is dark because the sun is not in the sky	• To know that light travels from a source (eg. the Sun, light bulbs and torches) • To know that light is needed to see things and that dark is the absence of light • To know that light from the Sun can be dangerous and how to protect their eyes	• To know that light travels in a straight line from a light source • To understand that luminous objects are seen as a result of light directly entering the eye, whereas non-luminous objects reflect light into the eye
	Transfer	• To know that shadows are created when somethng blocks the light	• To know that all materials reflect light • To know that shadows are formed when the light from a light source is blocked by an opaque object	• To know that shiny surfaces reflect light uniformly • To know that when light is reflected off a surface, its direction changes • To know that mirrors and periscopes work using reflection of light on smooth surfaces • To understand why shadows have the same shape as the objects that cast them as a result of light travelling in straight lines • To understand relationships between light sources, objects and surfaces

	Energy		• To know that shadows change as a result of diferent factors:
			  ○ Changing the position of the light source
			  ○ Changing the distances between the light source, object and surface
			• To know that shadows change position and length throughout the day as the Sun changes position in the sky
				• To understand how and why the distance between the object and the screen affects the size of the shadow
				• To understand how the angle of a reflected ray is affected by the angle of the incoming ray on a smooth surface

Sound		Reception	Year 4 Sound and vibrations
Scientific knowledge and understanding	Sources		• To know that sound is the result of vibrations
	Transfer		• To know that vibrations from sounds travel through mediums to the ear • To know that an insulating material reduces the amount of vibrations that pass through it and this can be used to protect the ears from damaging sounds • To know that different materials provide different amounts of insulation against sound
	Energy	• To know about differences in sounds	• To know a variety of ways to change the pitch or volume of a sound • To know that quicker vibrations cause higher-pitched sounds and slower vibrations cause lower-pitched sounds • To know that stronger vibrations cause louder sounds and weaker vibrations cause quieter sounds • To know that sounds get fainter as the distance from the sound source increases

Electricity		Year 4 Electricity and circuits	Year 6 Circuits, batteries and switches
Scientific knowledge and understanding	Sources	• To know that all electrical appliances need a power source, including batteries or mains electricity • To know that an electrical circuit needs a complete path for the electrical charge to flow through • To know the main components in a simple series circuit • To know the precautions for working safely with electricity	• To know a wider variety of components in a series circuit (including buzzer and motor) • To know the conventions used to draw circuit diagrams, including the recognised symbols for common components and using straight lines
	Transfer	• To know that some materials allow electrical charge to pass through them quickly and these are known as electrical conductors (eg. metals) • To know that some materials do not allow electrical charge to pass throught them easily and these are known as electrical insulators (eg. wood and plastic) • To know that metals are used for cables and wires because they are good conductors of electricity • To know that plastic is used to cover cables and wires because it is a good insulator	
	Energy	• To understand that an open switch breaks a series circuit so the components will be off • To understand that a closed switch completes a series circuit so the components will be on • To understand the relationship between bulb brightness and the number of bulbs in a circuit	• To know that the voltage of a circuit can be changed and how this affects bulb brightness (or buzzer volume)

Progression of Knowledge: Forces, Earth and space

		Reception	Year 1 Seasonal changes	Year 5 Earth and space
Scientific knowledge and understanding	Key facts	• To know that some trees change in the four seasons • To know some signs of each season (leaves on the ground, cold weather, daffodils growing and sunny weather) • To know that some animals hibernate or store food in winter	• To know the name and order of the four seasons: spring, summer, autumn, winter • To know that it is unsafe to look directly at the sun	• To know that the Sun is a star at the centre of our solar system • To know that the Sun, Earth and Moon are approximately spherical bodies • To know the names, order and relative positions of the planets and other main celestial bodies • To know that a moon is a celestial body that orbits a planet and give examples of moons that orbit other planets
	Forces in motion	• To know that the weather changes throughout the year • To know and compare weather types (rain, sun, snow, wind)	• To know weather associated with the four seasons and how it changes (in the UK) • To understand that day length varies across the four seasons, with fewer daylight hours in the winter and more in the summer	• To know that the Earth and other planets orbit around the Sun • To know that the tilt of the Earth and its orbit around the Sun causes the seasons • To know that the Moon orbits around the Earth • To understand how the Earth's rotation causes day and night and the apparent movement of the Sun across the sky
	Factors affecting forces			

		Year 3 Forces and magnets	Year 5 Unbalanced forces
Scientific knowledge and understanding	Key facts	• To know some examples fo contact and non-contact forces • To know that some forces are a result of contact between two surfaces, but some forces can act at a distance (eg, magnetism) • To know the North and South poles of a magnet • To know some examples of magnetic materials, including iron and nickel, and how they react to a magnet and each other • To know some different examples of magnets, including bar, horseshoe, button and ring • To know some uses of magnets	• To know that gravity is an non-contact force that pulls objects together • To know that air resistance and water resistance are both types of friction

	Forces in motion	• To know that friction is a contact force that acts between two surfaces to slow an object down • To know that magnetism is a non-contact force that affects objects containing magnetic metal • To understand that the opposite poles of a magnet attract one another and like poles repel one another	• To know that unsupported objects fall towards the Earth because of gravity • To know that friction, air resistance and water resistance act in the opposite direction to a moving object • To know that when forces are imbalanced, the speed, shape or direction of an object stays the same • To know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect
	Factors affecting forces	• To know that rougher surfaces have more friction between them than smoother surfaces • To understand that the strength of different magnets may vary	• To know that rougher surfaces have more friction between them than smoother surfaces and how that may affect movement • To know that the larger the surface of an object the greater the air or water resistance it creates

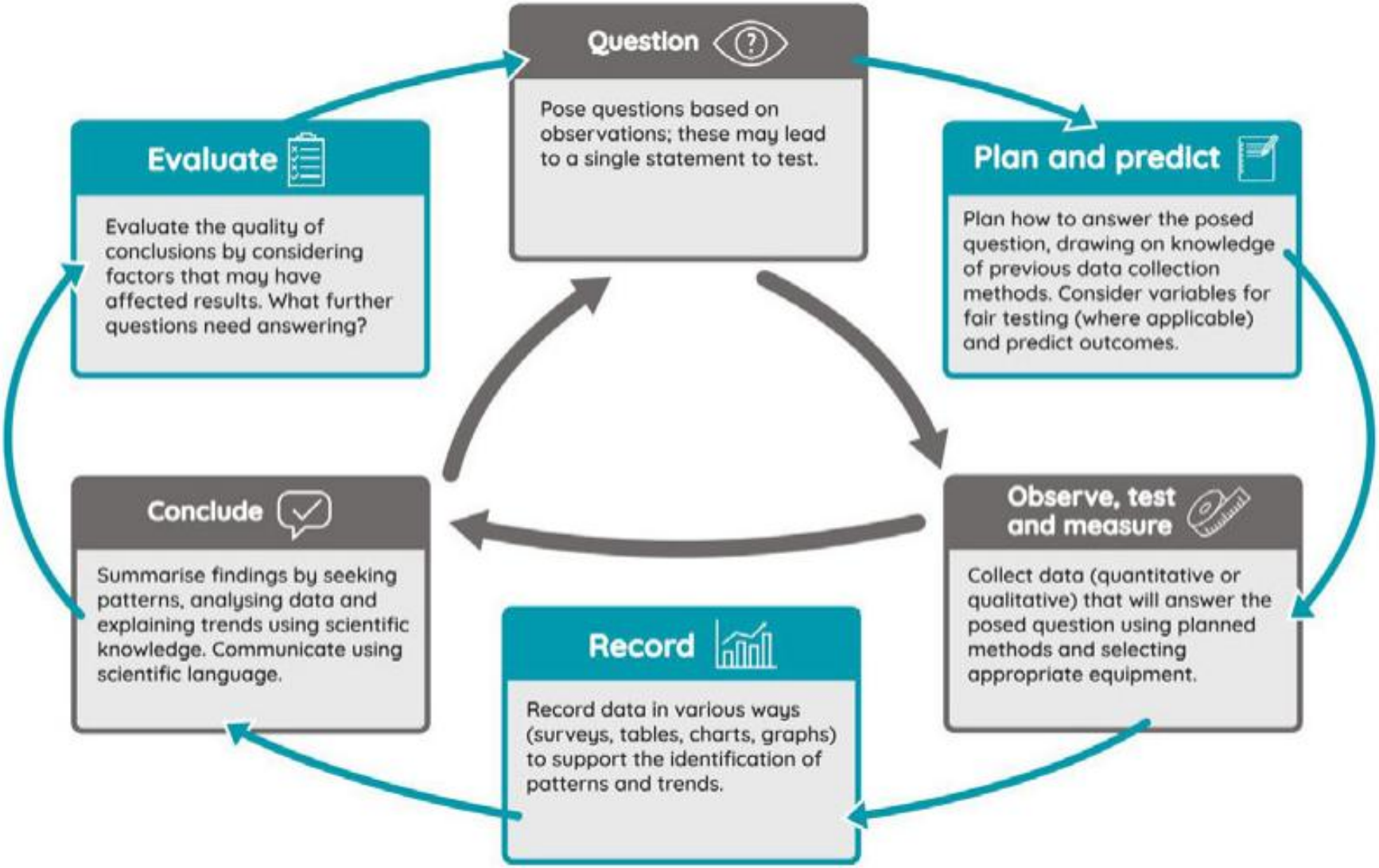
Progression of skills: Working Scientifically

	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Posing questions	Asking questions about the natural world with support	Exploring the world around them and raising their own simple questions Recognising there are different types of enquiry (ways to answer a question) Responding to suggestions on how to answer questions		Beginning to raise further questions during the enquiry process Considering what makes a testable question Beginning to recognise that there are different types of enquiry and that they are suitable for different questions Beginning to make suggestions about how different questions could be answered		Raising questions throughout the enquiry process Identifying testable questions Selecting the most appropriate enquiry method to answer questions and give justification	
Planning	Beginning to share ideas and suggestions, when working practically	Beginning to recognise whether a test is fair Deciding if suggested observations are suitable, with support Ordering a simple method		Beginning to select from options which variables will be changed, measured and controlled Beginning to suggest what observations to make and how long to make them for Planning a simple method, verbally and in writing Beginning to write a simple method n numbered steps Selecting and beginning to decide what simple equipment might be used to aid observations and measurements		Suggesting which variables will be changed, measured and controlled Making and explaining decisions about what observations to make and how long to make them for Writing a method including detail about how to ensure control variables are kept the same Writing a method that considers reliability to planning repeated readings Suggesting the most appropriate equipment to make observations and measurements and justifying their choices	
Predicting	Beginning to make guesses about what might happen	Suggesting what might happen, often justifying with personal experience		Make predictions about what they think will happen by: • Using scientific knowledge and/or personal experience to explain their prediction (because…) • Beginning to consider cause and effect when making predictions, where appropriate • Predicting a trend by considering how the changing variable will affect the measured variable. (The smoother the surface, the longer the distance the car will travel.)		Making increasingly scientific predictions by: • Using previous scientific knowledge and evidence to inform their predictions • Using scientific language to describe a potential outcome or explain why they think something will happen • Making links between topics to evidence a prediction	

Observing (qualitative data)	Commenting on what they see and hear in the natural world	Using their senses to describe, in simple terms, what they notice or what has changed	Using their senses to describe, in more detail and with simple scientific vocabulary, what they notice or what has changed	Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed
Measuring (quantitative data)	N/A	Using non-standard units to measure and compare Beginning to use standard units and read simple scales to measure and compare Beginning to use simple measuring equipment to make approximate measurements	Using standard units to measure and compare Using measuring equipment with increasing accuracy Reading scales with unmarked intervals between numbers	Using standard units to measure and compare with increasing precision (decimals) Reading a wider variety of scales with unmarked intervals between numbers
Researching	Recognising that information can be found online and in books	Gathering specific information from one simplified, specific source	Gathering specific information from a variety of sources	Gathering answers to open-ended questions from a variety of sources
Recording (diagrams)	Drawing and labelling pictures of plants and animals	Drawing and labelling simple diagrams	Beginning to draw more scientific diagrams by: • Using some standard symbols • Drawing in 2D to produce simple line diagrams • Labelling some more scientific vocabulary	Drawing scientific diagrams by: • Using a wider range of standard symbols • Drawing with increasing accuracy • Labelling with a broader range of scientific vocabulary • Annotating diagrams to explain concepts and convey opinions
Recording (tables)	Recognising that tables can be used to record information	Using a prepared table to record results including: • Numbers • Simple observations • Tally frequency	Using a prepared table to record results including more detailed observations Using tables with more than two columns Identifying and adding headings to tables Beginning to design simple results tables	Using tables with columns that allow for repeat readings Suggesting headings to tables, including units Designing results tables with increasing independence with consideration of variables where applicable
Grouping and classifying	Grouping objects, plants and animals with support	Grouping based on visible characteristics Organising questions to create a simple classification key	Grouping based on visible characteristics and measurable properties Populating a pre-prepared branching and number key Choosing appropriate questions for classification keys	Grouping in a broader range of contexts Organising the layout of number and branching keys Formulating appropriate questions for classification keys

Graphing	N/A	Representing data using pictograms and block graphs	Representing data using bar charts Drawing bars with greater accuracy Reading the value of bars with greater accuracy	Representing data by using line graphs and scatter graphs Plotting points with greater accuracy Reading the value of plotted points with greater accuracy
Analysing and drawing conclusions	Describing their discoveries and when working practically	Using their results to answer simple questions Beginning to recognise when results or observations do not match their predictions	Writing a conclusion to summarise findings using simple scientific vocabulary Beginning to suggest how one variable may have affected another Beginning to quote results as evidence of relationships Identifying data that does not fit a pattern (anomalous data) Beginning to use identified patterns to predict new values or trends	Writing a conclusion to summarise findings using increasingly complex scientific vocabulary Suggesting with increasing independence how one variable may have affected another Quoting relevant data as evidence of relationships Identifying anomalies in repeat data and excluding results where appropriate Comparing individual, class and/or model data to the prediction and recognising when they do not match Using identified patterns to predict new values or trends
Evaluating	N/A	N/A	Beginning to identify steps in the method that need changing and suggest improvements Beginning to identify which variables were difficult to control and suggesting how to better control them Commenting on the degree of trust by reflecting on: • Results that do not fit a pattern (anomalies) • The quality of results (accurate measurements and maintaining control variables) Beginning to identify new questions that would further the enquiry	Identifying steps in the method that need changing and suggesting improvements Identifying which variables were difficult to control and suggesting how to control them better Commenting on the degree of trust by also reflecting on: • Accuracy (human error with equipment) • Reliability (repeating results) • Sources of information (eg. Websites, books) Posing new questions in response to the data that would extend the enquiry Deciding what data to collect to further test direct relationships

Working scientifically – Enquiry Cycle



THE STOKE POGES SCHOOL

Science Learning Journey

Science in Action

Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
To know some different job roles	To know about famous scientists throughout history To know about a range of jobs and careers that use scientific knowledge and methods To know about the work of modern-day scientists To know about science in the news and recent discoveries To know there are spiritual, moral, social and cultural links with Science		**As Year 1/2 plus:** To know about the methods and equipment used by scientists throughout history and how these have led to modern methods To know how scientific knowledge has changed over time, leading to the current understanding of Science To know about current scientific research and what it aims to achieve in the future To know that collaboration and peer reviewing is essential for effective scientific progress		**As previous, plus:** To know how scientific evidence is used to support or refute ideas or arguments To know that mistakes can lead to new discoveries	

Science Vocabulary Progression

Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Working Scientifically						
Question, anwer, observe, observing, equipment, identify, sort, group, compare, differences, similarities, describe, measurement, test, results, secondary sources, record – diagram, chart			Explanations, conclusion, predictions, criteria, classify, chnages, data, contrast, evidence, improve, secondary sources, guides, keys, construc, interpret Research – relevant question Equipment – thermometer Data – gather, standard units, record, classify, present Record – drawings, labelled diagrams, keys, bar charts, tables		Plan, variables, measureents, accuracy, precision, repeat readings, predictions, further comparative, fair test, identify, classify and describe, patterns, systematic, quantitative measurements Report data – scientific diagrams, labels, classification keys, tables, scatter graphs, bar graphs, line graphs, conclusions, causal relationships, explanation, degree of trust, oral and written display, presentation, evidenc ideas, arguments Biology, physics, chemistry	
Animals, including humans						
Adult, child, baby, animal, bird, fish, head, leg, arm, mouth, face, back, toe, finger, hand, foot	Amphibian, fish, reptile, mammal, bird, herbivor, omnivore, carnivor, head, nose, ear, neck, shoulder, arm, elbow, wrist, hand, back, chest, hip, leg, knee, ankle, foot, wing, beak, tail, fin, sight, smell, touch, taste, hearing	Survival, water, air, food, reproduce, adult, baby, offspring, kitten, calf, puppy, food chain, prey, predator, camouflage, protection, exercise, hygiene, balanced diet	Skeleton, skull, bones, muscles, movement, support, protection, nutrition	Mouth, tongue, teet, oesophagus, stomach, small intestine, large intestine, nutrients, absorb, canine, incisor, molar, carbohydrate, protein, vitamins, fat	Womb, foetus, embryo, gestation, baby, toddler, teenager, elderly, growth, development, puberty	Function, circulatory system, heart, valve, blood vessel, vein, artery, transport, oxygenated, deoxygenated, lifestyle, drug, cardiovascular, pulse, capillaries, ventricle
Plants						
Plant, leaf, flower, tree, bush, grass, woodland, seed, grow	Deciduous, evergreen, tree, leaf, flower, blossom, petals, fruit, bulb, seed, roots, stem, trunk, branches	Growth, germinate, light, temperature, reproduce, lifecycle	Air, water, transportation, nutrients, soil, reproduction, seed formation, seed dispersal, pollination			
Living things and their habitats						
Carnivore, predator, home, habitat, lifecycle		Living, dead, habitat desert, species, microhabitat, woodland, meadow, hedgerow, pond		Vertebrates, invertebrates, environment, habitat, classifcation keys, producers, predators, prey, consumer, adaptation	Life process, reproduction, offspring, biomes, biodiversity	Characteristic, classification, organism, micro-organism

Materials						
Hard, soft, mix, join, wood, plastic, glass, hot, cold	Wood, plastic, glass, paper, metal, rock, hard, soft, rough, smooth, shiny, dull, bendy, stiff	Brick, fabric, elastic, foil, property, solid, waterproof, absorbent, opaque, transparent, squash, bend, flexible, twist, stretch, push, pull, roll, slide, bounce	Soils, organic matter, fossil, crystal, sandstone, granite, marble, pumice, absorbent, crumble, sedimentary, layer, sediment, igneous, magma, lava, gas bubbles, metamorphic, change, squeeze, pressure	States of matter, solid, liquid, gas, evaporation, condensation, particle, temperature, freezing, heating	Hardness, transparency, conductivity, electrical, thermal, solubility, solution, dissolve, filter, evaporate, sieve, reversible, irreversible	
Light and sound						
Rainbow, torch, shadow, light, sound, loud, quiet	Ear, nose, eye, see, smell, taste		Light source, mirror, reflect, reflective, reflection, shadow, transparent, opaque, translucent	Vibration, wave, volume, pitch, tone, insulation		Reflection, refraction, spectrum, rainbow
Earth in space / Seasonal change						
Earth, moon, space, star, winter, summer, spring, autumn, rain, clouds, sunshine, snow	Season, spring, summer, autumn, winter, month, year, day, night, sun, moon, light, dark				Earth, sun, moon, solar system, axis of rotation, day, night, phases of the moon, star, constellation	
Forces						
		Squashing, bending, twisting, stretching	Force, contact, magnetic, attract, repel, poles		Air resistance, water resistance, friction, gravity, lever, gear, pulley, Newtons	
Electricity						
Battery, switch				Appliance, battery, power, main power, circuit, series, cell, battery, wire, bulb, switch, break in circuit, conductor, insulator		Circuit – series, parallel Voltage, volts, amps